Eco 362: Economic Growth
Fall 2013
Problem Set 4- Solutions

Question 1

Consider the Solow model without technology growth $Y_t = AK_t^\alpha L_t^{1-\alpha}$. Consider the model of an economy open to capital flows. How will an increase in the growth rate of population, holding constant the saving rate, affect GDP per capita? How do these results contrast with the Solow model where funds for investment come from domestic savings?

Solution: In the closed economy Solow model, an increase in the growth rate of the population will reduce the steady-state level of income per capita by reducing the steady-state level of capital per capita. To see this, recall that the accumulation of capital is positively related to the level of savings and negatively related to the growth rate of the population and depreciation.

$$k^{SS} = \left(\frac{sA}{1+n}\right)^{\frac{1}{1-\alpha}}$$

As a result, population growth will lower the income per capita of the country.

In an open economy, the change in the growth rate of the population does not affect the world rate of return, r_w, nor the steady-state level of capital within the country. The steady-state level of capital is given as,

$$k^{SS} = \left(\frac{\alpha A}{r_w}\right)$$

Therefore, the growth rate of the population, n, does not enter into the determination of the steady state. There will be no change to GDP per capita in the steady state. In the short run an increase in n will lower the domestic level of capital per capita. The marginal product of capital will rise, inducing investment from abroad. The level of capital per capita will rise until the marginal product of capital falls to meet the world rental rate r_w, Thus, GDP per capita falls and then rises to the original steady state value.

Question 2

A recent study has concluded that the tariff on the import of widgets has raised real wages in the domestic widget industry. Based on this finding, it has been suggested that tariffs be raised in all industries. Comment on the wisdom of this proposal

Solution: A tariff on the import of widgets is a form of trade protection, insulating the domestic widget industry from international competition and pressure. Although the result is a higher wage for those members of the widget industry, the higher wage comes at a cost to consumers of widgets and the economy in general. Trade liberalization can result in greater technological progress and higher levels of efficiency through competitive pressure. Consequently, the suggestion to raise the level of import tariffs on all industries, based on the findings of the study, does not incorporate the drawbacks to trade protection policy, and is harmful for the economy as a whole in the long run.

Question 3

Coffee is primarily made from two different beans, Arabica and Robusta. The beans grow in different countries. Suppose that in the year 2008, a major scientific study finds that drinking coffee made from Arabica beans contributes to heart disease, while drinking coffee made from Robusta promotes better health. As a result, the price of Arabica beans falls and the price of Robusta beans rises. An economist reads about these goings-on and says "Great. This will help me understand the connection between income and quality of government." Explain her thinking, what data she would look at to carry out this investigation, and how she would interpret the results. Also, explain why looking at this data would be superior to simply examining the correlation between income and the quality of government.

Solution: The economist understands that the only way to determine whether more income causes better government or whether better government causes more income is to find an event in which we know that one determinant changed, and which cannot plausibly have caused a direct change to the other, and then see if the other determinant changed. In statistics, this is known as having a valid instrument.

In this example, the change in the prices of the different beans is obviously going to have an effect on income in the two countries. In this case, we know that the income change was not due to government quality. Therefore, if government quality rises due to this increase in income, we know that income causally affects government quality. It still could be the case that better government quality also affects income, but at least we have determined causality for the converse.

If the researcher only looked at the simple correlation between quality of government and income, he or she would not be able to determine causality. Also, it there is dual causation (causality running in both directions), then the magnitude of the correlation could be much different than simple correlation due to multiplier effects, for example.

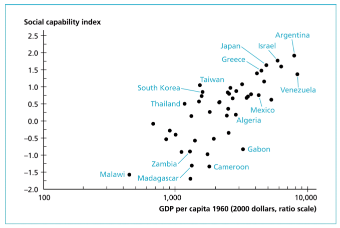
Question 4

How would the availability of student loans to finance education influence the relationship between inequality and the accumulation of factors of production? In particular, how would student loans affect the level of inequality that maximizes factor accumulation?

Solution: In class we saw that higher inequality is good for growth via the channel of physical capital accumulation but bad for growth via the channel of human capital accumulation.(Make sure you understand why). The availability of student loans implies that at any given level of inequality, the accumulation of human capital will be higher. So the cost of inequality in terms of reducing human capital accumulation is mitigated. Thus the growth-maximizing level of inequality will be higher in the presence of student loans than in their absence

Question 5

Based on the diagram below, but not on what you know of their subsequent history, which country would you expect to have a higher growth rate over the period 1960-2005, Mexico or Thailand? Explain why.



Sources: Temple and Johnson (1998); Heston, Summers, and Aten (2006).

Solution: In the figure, the two countries have roughly the same level of social capability. However, Thailand is significantly poorer. Since we would expect countries with the same levels of social capability to end up with similar incomes in the long run, we would expect Thailand to grow faster.